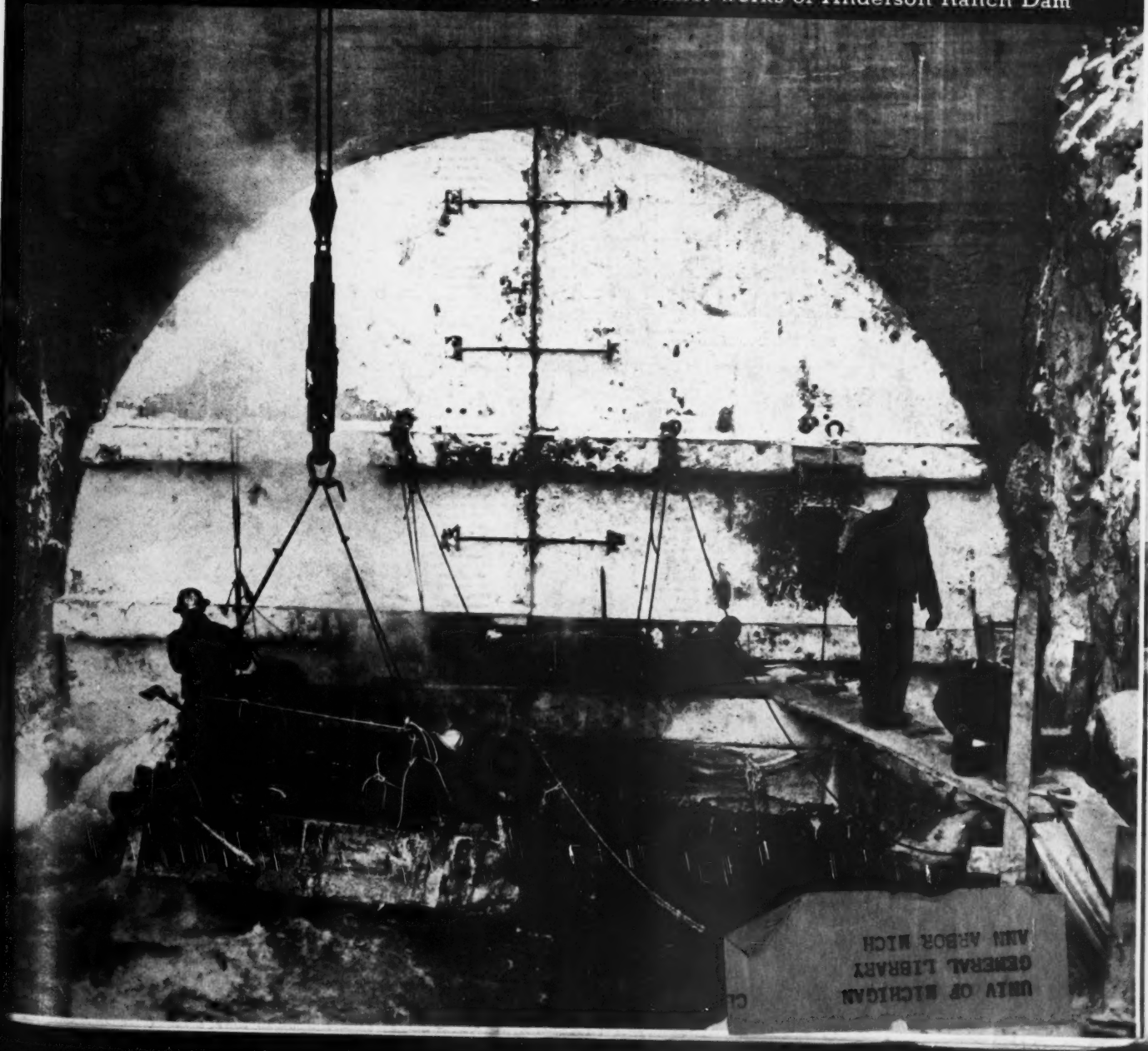
ENGINEERING NEWS-RECORD

APR 2 19

South Fork of Boise River is plugged, diverting water to outlet works of Anderson Ranch Dam



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"Torque-Tailored" MOTORS

PULLED THIS FLOOD-CONTROL JOB "OUT OF A HOLE"

SIX big flood pumps were needed to lift the waters of Cincinnati's Mill Creek over the barrier dam when the Ohio River was in flood. Two factors dictated the use of synchronous motors for driving these pumps—the large amount of power required, and the low pump speed.

But, the pumps were below the flood level of the Ohio—literally "in a hole." This resulted in a siphoning action which caused an unusual peak in the starting torque required by the pumps (see white arrow below). To get over this peak with synchronous motors of conventional design would have required oversized motors with high starting currents which would have resulted in excessive voltage disturbances. The solution lay in "tailoring" the torque characteristics of the synchronous motors to meet the pumps' individual needs.

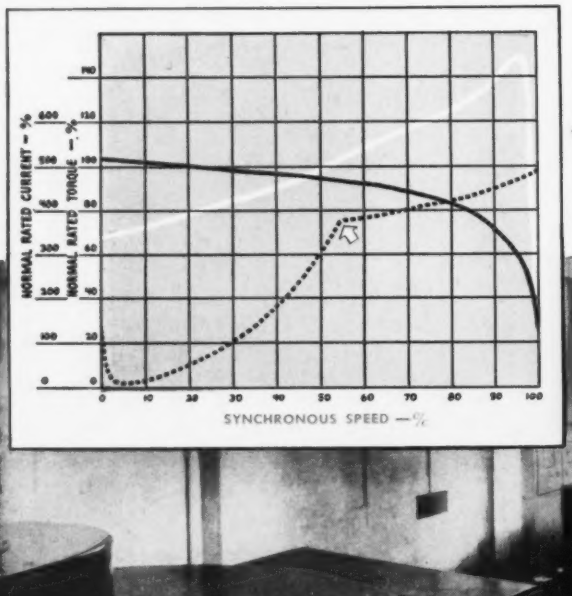
G.E. finds the answer

Our engineers prepared specifications for synchronous motors which convinced the flood-control engineers that these motors, as designed and built by General Electric, were right for the job *in advance* of installation. Our recommendation was for six specially built vertical synchronous motors, rated 6500 hp at 180 rpm, unity power factor.

The white line on the chart shows how these G-E motors provide ample starting, accelerating, and pull-in and pull-out torques. Motor torque continuously exceeds pump requirements by a safe but never excessive margin. Starting current (thin black line) is kept well within the capacity of the power system. Recently the pumps were called into action to divert flood waters, and the motors proved the soundness of their design for the job.

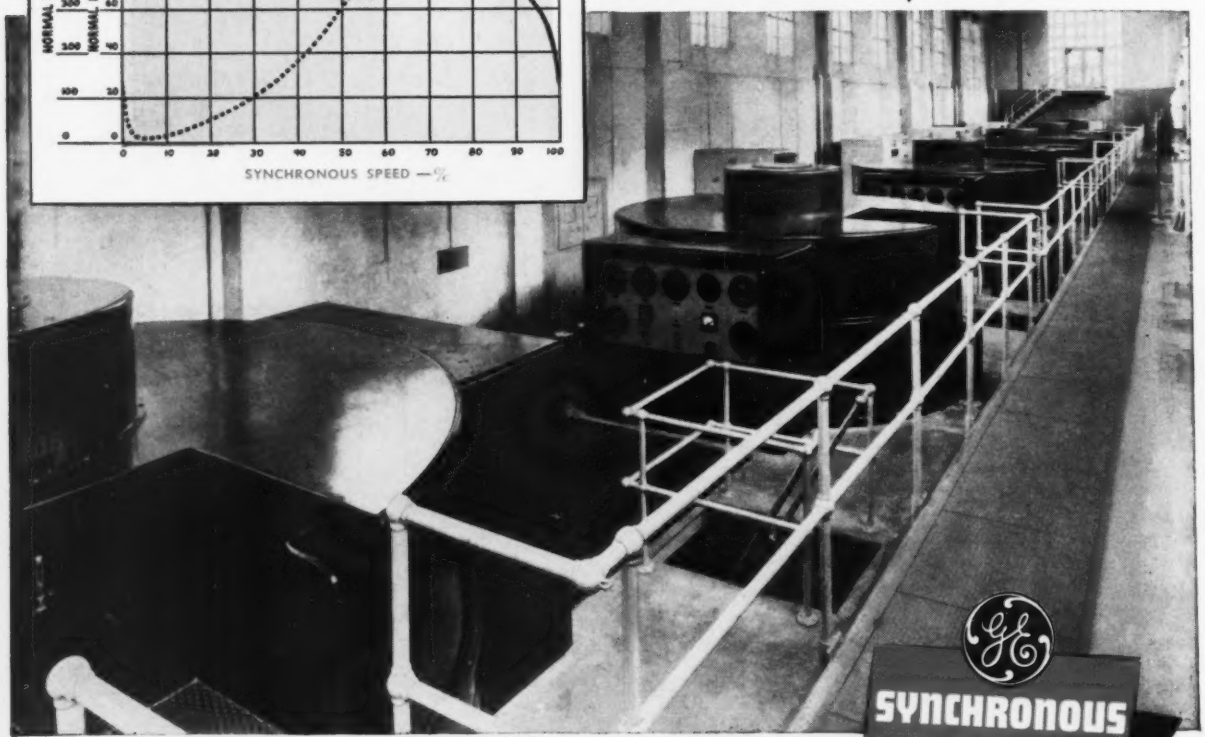
For jobs of every size

Whether your synchronous motor needs call for special engineering or a standard design, you will find definite advantages in coming first to General Electric for help in writing specifications, or for a quotation on the most suitable and economical unit. G.E. has the widest range of motors available—in vertical and horizontal construction, and in ratings from 20 to 65,000 hp. They combine reliability and durability with the trim good looks that can add much to the prestige of your job. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



TEST RESULTS, showing how motor-torque and -current characteristics matched pump requirements and the characteristics of the power supply.

THE MODERN GOOD LOOKS of G-E synchronous motors match their outstanding electrical behavior. A feature of this installation is the use of built-in gage boards with instruments for recording bearing, winding, and cooling-water temperatures.



GENERAL ELECTRIC

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News of the Week

ENGINEERING NEWS-RECORD • APRIL 25, 1946 • VOLUME 136 • NUMBER 17

PRA rejects few highway bids on grounds of too-high costs

Only $2,300,000 worth of work turned down by agency in last three months—Policy requires that bids 50 percent over prewar prices be submitted to Washington

In spite of numerous complaints that the Public Roads Administration is seriously delaying the postwar construction program of numerous state highway departments by disapproving an excessive proportion of bids taken as too high, data released this week show that PRA has turned down only two percent of the construction on which bids were submitted during the first three months of 1946. The state highway departments, during the same period, have failed to approve about 20 percent of the total volume on which bids have been opened.

As of April 6, PRA had approved $389,445,000 worth of work submitted as general programs of the state highway departments planned to be carried out with the aid of federal funds made available during the first postwar fiscal year. The $389,445,000 figure includes both federal and state expenditures. On the same date the PRA had approved detailed plans for $152,031,000 of construction planned to be financed partially with postwar federal funds.

State highway departments and the District of Columbia received bids during the first three months of the year on 576 federal-aid road projects, according to reports from PRA field offices. The total amount of low bids submitted on these projects—including one in Puerto Rico—was $104,212,176.

Contracts were awarded in the 3-months period for 413 projects, to cost $71,803,075. A total of 124 bids involving expenditures of $21,096,040 were rejected by the state highway departments, without action by PRA, because of the extent to which they exceeded estimated costs. Rejections by the states represented approximately 20 percent of the total volume of work on which bids were taken.

In contrast, bids on 15 additional projects which would have cost only $2,292,425—or 2 percent of the total—were rejected because of PRA's refusal to concur in the award of contracts. Refusal of concurrence on these projects was prompted by high bids.

At the end of March, contract awards were pending on 24 projects having a total construction cost of $9,020,636.

PRA policy outlined

Under a recent ruling, PRA field engineers are required to withhold approval and submit to the Washington office for review all low bids that are 50 percent above the cost of similar federal-aid road construction undertaken in 1940. In several instances, however, PRA has approved award of contracts that were more than 50 percent above the contract price of comparable highway work pre-war.

Concurrence or non-concurrence in contract awards recommended by the states is based upon a careful study of the individual project, with due consideration given to the increased cost of labor and materials, the urgency of the need for immediate construction, and other conditions, according to roads administration officials.

The number of contracts let during March for all types of highway work under state or federal supervision, including federal projects, federal-aid projects, and road work financed entirely by state or local government agencies (state supervised), amounted to 584. These contracts were for improvements on 3,176 miles of roadway, at a total cost of $39,488,044. These data compare with 284 contract awards in February, for $26,474,085, and 219 contract awards in January for road projects costing $28,127,704.

During the 3-months period, 1,087 contracts were awarded for federal, federal-aid and state supervised non-federal-aid projects, at a total cost of $94,089,833. The figures include a small amount of work on national forest roads.

State Dept. continues work of O.I.A.A.

By a presidential order, effective May 20, the Department of State will take direct control of the extensive health and sanitation, agricultural and educational programs which have been conducted in cooperation with American republics by the Office of Inter-American Affairs.

These programs were not carried out by the Office of Inter-American affairs itself, but through government corporations which it controlled. Although the OIAA will end its direct operations on that date, the corporations will continue to fulfill cooperative agreements.

The over-all capitalization of the Institute of Inter-American affairs is $65,777,562. Some $50,000,000 will have been disbursed between the start of the programs in 1942 and June 30, 1946. The balance is committed to programs under agreements with the other American republics for health and sanitation and food supply work during the fiscal years of 1947, 1948, and 1949. The other Republics have contributed $27,000,000 to the work, and show trend to earmark more of their national budgets for this type of work, asking of the institute little more than technical assistance. Operations in Colombia in health and sanitation work are proceeding under a Colombian grant of $1,200,000, while the institute funds committed to the program are only $120,000. A similar situation exists in Brazil, Guatemala, and other republics.

The Institute of Inter-American Affairs has 57 active agreements in 18 Latin American nations. The educational foundation has 15 such agreements in 14 countries. It has carried on educational activities in all 20 of the other American countries, and has distributed a total of about 550,000 books, pamphlets, maps, charts, and other teaching materials.

Wallace K. Harrison, director of the Office of Inter-American Affairs, and Col. Harold B. Gotaas is acting director, as well as president of the Institute of Inter-American Affairs.

NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Highways—*Washington* state's program for 1946 calls for an estimated $13,254,210 worth of work, including $1,690,000 on the Pacific Highway. . . . *Minnesota* has awarded contracts for more than 300 miles of state highways, including the scenic highway along the St. Croix River. . . . PRA has approved a $1,300,000 reconstruction program of U.S. 66 near *Flagstaff, Ariz.* . . . *Georgia's* highway commission has announced that construction projects of $34,000,000 will be under way by July 1. . . . *Oregon's* $36,000,000-three-year program is threatened by shortage of heavy lumber for bridge timbers. . . . The *Peoria, Ill.*, planning commission proposes a scenic drive around Lake Peoria. . . . *Nashville, Tenn.* expects to repave 60 miles of streets this year. . . . A 4-lane, 28-mile highway on U.S. 66 from *Shamrock, Tex.*, to the *Oklahoma* border is being planned, work to start late in the summer. . . . The *Missouri* highway commission will advertise projects for an oiling program to convert about 575 miles of gravel roads to a dustless surface. . . . *New Brunswick, Can.*, is planning appropriations for 1946 of $5,000,000 for hard-surface roads.

Water Supply and Sewerage — *Columbia, Mo.*, is providing $250,000 for sewer improvements. . . . A committee of engineers has warned *Winston-Salem, N. C.*, that the city will soon face a water shortage. . . . *San Bernadino, Calif.*, county supervisors have authorized a $97,000 sewage treatment plant for Big Bear Valley. . . . *Belleville, Ill.*, has approved revenue bonds of $800,000 to enlarge the sewage disposal plant and for sewers. . . . *Quincy, Ill.*, city council approved a contract for survey plans and specifications for complete rehabilitation of its sewer system which may cost over $1,000,000.

Bond Issues—*Jackson, Tenn.*, will vote May 28 on $1,200,000 for city improvements. . . . *Los Angeles, Calif.*, voters on Aug. 6 will pass on two bond issues totaling $4,275,000 for an addition to the county museum, an exhibit building in Hancock Park; and a new building for the Otis Art Institute. . . . *Rockford, Ill.*, on April 9 approved $1,500,000 for a sewage disposal system. . . . *Altus, Okla.*, voters April 12 approved four issues totaling $929,250 for sewer system, power plant, and water system improvements.

Construction—Southern California Edison Co. will spend $15,000,000 for a new steam station at *Rendondo Beach, Calif.* . . . Kirven's Department Store *Columbus, Ga.*, has awarded a contract for a $1,000,000 building program. . . . Architects have been chosen to draw plans for a $2,000,000, twelve-story hotel at *Savannah, Ga.* . . . S. E. Marsengill Co. announces a million-dollar building program at its *Bristol, Va.* plant.

Calendar of Meetings

NATIONAL

American Water Works Association, annual convention, Municipal Auditorium, St. Louis, Mo., May 6-10.

President's Highway Safety Conference, Washington, D. C., May 8-10.

International City Managers' Association, annual meeting, Montreal, Canada, June 16-21.

Society for the Promotion of Engineering Education, annual convention, Jefferson Hotel, St. Louis, Mo., June 22.

American Society for Testing Materials, 49th annual meeting, Hotel Statler, Buffalo, N. Y., June 24-28.

Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Buffalo, N. Y., June 24-26.

REGIONAL

New England Sewage Works Association, Pickwick Arms Hotel, Greenwich, Conn., May 17.

Pacific Northwest Sewage Works Association, Gearhart Hotel, Gearhart, Ore., May 22.

Pacific Northwest Section, American Water Works Association, Gearhart Hotel, Gearhart, Ore., May 23-24.

New York State Sewage Works Association, spring meeting, Hotel Hamilton, Utica, N. Y., May 24-25.

Penna. highway bidders Scarce, costs out of line

The Pennsylvania State Department of Highways is now averaging only two bidders for each highway contract put up for letting, and some bids are 100 percent above pre-war levels, Ray F. Smock, new secretary, told the annual Secretaries' Conference of the Pennsylvania Motor Federation at Harrisburg April 15.

"We have plans ready to proceed with the first year's program and have advertised for bids this year amounting to more than $15,000,000 of work," Mr. Smock said. "The response has been disappointing. We have recommended for award more than $9,000,000, but we could not award the remainder on account of not receiving satisfactory bids.

"Most authorities agree that highway construction costs are about 35 percent above the pre-war average, with a range of 30 to 50 percent on individual projects.

"On our larger contracts, where uncertainty evidently exists, most of the bids are entirely too high. In some cases they are 80 to 100 percent above the pre-war level."

Oklahoma to go ahead

Despite the shortages of materials, uncertainties about building costs, and doubt as to contractors' willingness to bid, the Oklahoma State Board of Affairs has decided to go ahead with the public building program for state institutions under its direction. Architects will be asked to prepare plans as soon as possible.

"We will ask for bids," said Governor Kerr, "and see what the contractors offer, but we are not sure the prices will be such that the work can be done.

No highway bids at Rochester, N. Y.

Five million dollars' worth of highway construction work is ready for bids in the Rochester, N. Y., district but the state did not get a single bid. Another million dollars' worth has been advertised.

According to Elmer C. Lawton, district engineer of the N. Y. State Department of Public Works, jobs awaiting bidders include: three miles of highway between Attica and Batavia at an estimated cost of $327,000; 10 miles of construction on the Arcade-Bliss highway, $823,000, and a bridge over the Genesee River in Mt. Morris, $327,000.

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Intensify NWSB drive on high building wages

National War Stabilization Board to increase enforcement staff to keep construction wages in line

Accelerated efforts to enforce wage controls in the building and construction industry have been emphasized by the recent imposition of income tax penalties against 13 building contractors engaged on remodeling and repair work on hotels, tourist homes and similar facilities in the Miami, Fla., area.

Nine of the contractors penalized for paying above the approved wage scales have appealed unsuccessfully to the National Wage Stabilization Board regarding the decisions reached by the regional wage stabilization board at Atlanta. Two cases were dismissed because of convincing evidence of good faith. The penalties were the result of hearings conducted late last year, and only cover a period beginning Jan. 1, 1945. The total amount of the disallowance for income tax deductions is $68,461, only a part of the actual amount of the illegal wages paid. The actual loss to a given contractor will depend on his income tax bracket.

With controls off wage increases in other fields, and few instances of illegal wage decreases, the NWSB's enforcement staff will be able in a few weeks to devote its full time to checking on wage violations in construction, said Martin Kurasch, chief of NWSB enforcement activities. In addition to assigning full enforcement personnel to combating the problem of run-away wage increases in building and construction, NWSB contemplates increasing this staff.

How control will be enforced

Inspectors from the wage-hour division, serving as agents of NWSB, will check employer payroll records for evidence of payments above the approved scale or other devices to circumvent the intent of the law. These would include pay for hours not worked, gratuities and misclassifications.

The entire pay to an employee may be disallowed as a labor cost in computation of income tax if it includes any illegal payment. In addition, there are criminal penalties of $1,000 fine, one year imprisonment for wilful violations, or both. While the imprisonment feature has not yet been invoked, it was suggested that it might be used against employers who attempt to faking their payrolls.

Two serious effects of unlawful wage increases are outlined by Kurasch as follows: (1) Increased building costs and (2) labor pirating and reduced productive efficiency, which is so urgently needed at this time.

WAB lists construction wage controls

Re-emphasizing that wage controls still exist in the building and construction industry, the Wage Adjustment Board last week issued a digest of its policies to guide employers in the industry.

The board's jurisdiction covers mechanics and laborers—including working foremen—employed on construction sites. Employers who raise or lower wages of these workers without prior approval, or who misclassify the jobs or grant other concessions, are subject to penalties through disallowance of the wages as costs for income tax purposes.

An outline by WAB of pertinent provisions of the policy includes:

1. No wage increase or decrease may be paid for the work of on-the-site employees without prior WAB approval, except where the board has approved an increase in wages having general applicability in the area. In such instances, contractors performing non-federal work who customarily have been paying the old area rate, may pay the higher rate on contracts undertaken after the higher rate went into effect. The higher rate, however, may not be paid on going construction projects without approval. A contractor who has been paying below the prevailing rate has no authority to make changes without obtaining approval.

2. A new contractor in an area (whether from another locality or just getting started) may pay the rates recognized by the WAB in that area.

3. Employees must be classified according to the work they are performing, and paid the rate for that job for hours actually worked. Gratuity payments for time not worked is a violation.

4. Changes in premium compensation, are subject to the same requirements as wage increases or decreases.

5. The board generally disapproves incentive payments, daily travel time, vacations with pay, paid sick leave, bonuses and welfare benefits and other so-called "fringe" benefits.

6. The payment of actual travel and subsistence expenses may be made where provisions for them were incorporated in union by-laws and had become an established practice in the area prior to Oct. 3, 1942.

Wage accords continue to show rises

Construction labor and contractors are continuing to reach, in most cases, amicable agreements, which provide for substantial rises in rates of pay, according to reports to *Engineering News-Record*.

During the last week these reports included:

Wage increases for four building trade crafts in the Spokane, Wash., area were approved by the Wage Adjustment Board. Plasterers and plasterers' helpers were boosted 20 cents an hour to $1.50 and $1.95; sheet metal workers, 20 cents per hour to $1.70; roofers, 12½ cents to $1.37½ cents, and glaziers, 10 and 14 cents, to $1.35 per hour.

At St. Louis, Mo., where union hoisting engineers and union brick layers recently negotiated substantial raises (*ENR*, January 31, vol. p. 149) the AFL Steamfitters' Union and city plumbing and air-conditioning contractors agreed to a wage increase of 12½ cents an hour over the current $1.75 rate, if approved by WAB.

A controversy over wage rates that has prevented award of a contract on San Francisco's municipal airport for more than a month was ruled settled last week by San Francisco's city attorney, John J. O'Toole.

The dispute developed through the proposed payment by the Public Utilities Commission of double-time rates to workmen for work on Saturdays and Sundays. The Northern California Chapter of the Associated General Contractors termed the double-time rate illegal on the ground that the existing wage rates of time and a half for Saturdays and Sundays, set up by the Wage Adjustment Board, should be recognized by the city.

On the basis of an opinion from O'Toole, workers will get double time.

The delayed contract involves moving 2,000,000 cu.yd. of fill, and is part of a $20,000,000 improvement program (*ENR*, Nov. 22, 1945, vol. p. 8).

At Charlotte, N. C., the City Building Trades Council announced it would be glad to sit down with building contractors and negotiate problems involved in a proposal made by the Carolinas branch, AGC for the employment of apprentices under an accelerated training program as a means of speeding the general building program.

Wage scales for building trades workers on public projects in New Mexico will be increased at least 18 percent above the scales set in 1943, Alda Joiner, the Mexico State Labor Commissioner, said recently. The new scale raises common labor from 40 cents to 75 cents; boilermakers, from $1.50 to $1.65; journeymen carpenters, from $1.25 to $1.50; painters, from $1 to $1.25; and plumbers and plasterers, $1.50 to $1.75.

DEVELOPMENTS BEYOND U. S. BORDERS

Digested from reports by Engineering News-Record correspondents and the McGraw-Hill World News Bureau

Russia announces new 5-Year plan in which construction plays major role—Long trunkline highways will bring outlying regions closer to Moscow—High priority to hydroelectric developments

Keystone to Russia's postwar development is heavy construction. Top priority has been given to the rebuilding of war-damaged factories, dams, power plants and roads. In addition, much attention will be paid to enlargement of facilities built during the war years, for, contrary to popular belief, a substantial amount of permanent construction went ahead in unoccupied areas.

Soviet engineers, up against the same material shortage problems as American contractors, are endeavoring to carry out the following work as blueprinted under the U.S.S.R.'s fourth 5-year plan.

Highway Construction—The Central Roads Administration has drawn up elaborate plans for criss-crossing the Soviet Union with a series of new trunk highways. Reconstruction has already begun on the 470-mile highway linking Moscow and Kharkov where particular attention is to be paid to the approaches to both terminal cities as well as to bridge crossings of the Dnieper River at Dniepropetrovsk and Zaporozhe. Work has also been begun on the 720-mile Moscow-Leningrad road and a highway to link Moscow with Simferopol in Crimea.

Hydroelectric Plants—Plans of the People's Commissariat of Electric Power Stations call for the erection of 41 hydroelectric plants, 12 to be put in operation at part capacity during the 5-year period. Plans are being drawn for an additional 24 stations. An important engineering project to watch is on the Angara River in Siberia, where apparently the Russians plan a giant TVA-type development. The first section of the power plant there is projected to turn out some 800,000,000 kw.-hr. annually.

Among the Urals hydro plants, the Novaya Kamskaya station will be particularly important. It will harness the Kama, main tributary of the Volga. Large power plants are also planned for Mingechaur in Azerbaijan and Karkhad in Uzbekistan. The plant in Azerbaijan will produce cheap power for the oil industry, and also provide water to irrigate large areas.

The Soviets figure that each killowatt-hour of hydro power saves about 1½ kilograms of peat-coal fuel.

Factories—Broad-scale industrialization is under way throughout the Soviet Union, but emphasis is on the automobile industry which, if the plans are successfully executed, will be quadrupled in the 5-year span. The People's Commissariat of the Medium Machine Building Industry reports that the Moscow, Gorki, and Urals auto plants will be expanded, and that the one at Yaroslavl will be reconstructed. Six thousand workers are currently building factories for the new Dniepropetrovsk auto plant.

Dam Construction—Work has begun on two large water reservoirs in the Donbas Basin. One, with a capacity of 35,000,000 cubic meters, is being built on the Byk River, a tributary of the Dnieper, near Konstantinovka, and the other, with a capacity of 20,000,000 cubic meters, on a tributary of the Don in Rostov region.

Municipal Construction—In its special 5-year plan, the Academy of Architecture has put particular emphasis on municipal improvement, not only as it applies to street lighting, water mains, and sewers, but as to house construction as well. Typical of these major municipal projects is in the city of Baku, Azerbaijan, where a 160-mile water main is being built to pipe 81 mgd from the underground springs of the Khachmarsk Forest to the city.

Oil and Gas—The rapidly expanding oil industry of Azerbaijan and the famous oil fields of Baku, Grozny and Emba, will be supplied with pipe by a new rolling mill now under construction at Sumgait on the Caspian Sea. The mill will turn out the equivalent of 40 percent of all the Soviet heavy industry's prewar production in all categories of tubing. In addition to the pipe mill, numerous other plants have already gone into production making such things as plastic materials and synthetic dyes.

A 530-mile pipeline bringing gas to

***Russia's Five-Year Plan**—Railway electrification, highway construction, new factories, hydroelectric power plants, subways are all included in development programs recently announced by the Soviet. Locations of some of the major works are shown here.*

Moscow from Saratov on the Volga River and running through five regions of the Soviet Union is now augmenting the capital's present supply, with 1,350,000 cu. meters of gas daily. The project was placed in operation the first of the year. The pipeline was laid underground throughout its entire length, and at river crossings twin pipes were used. About 50,000 tons of pipe were required.

Leningrad will also soon have a new gas supply, this to come from Estonian oil shale regions. The city has under construction a 329-mile distribution system to make gas available for heating.

Moscow Subway—Elaborate designs have been completed for six of the twelve subway stations planned along the new 20-kilometer circuit subway line under construction in Moscow. The new line, bringing the total length of the Moscow subway to about 60 kilometers, will connect seven of the city's large railway stations and 18 of its municipal districts. Plans for the six new stations call for the use of marble, granite and Moscow white stone as the basic materials. Each will have heated vestibules and will be elaborately developed architecturally. It is said that excavation for the new line will run to 2½ million cu. yd.

Irrigation—The fourth 5-Year Plan calls for many new canals for irrigation purposes. One of these, in the vicinity of Mingechaur, Azerbaijan, will permit irrigation of up to a million acres of grain fields and about a half million acres of Egyptian cotton. A part of this project is said to be an earth dam that will create the largest artificial reservoir in the world.

Another dam, for which large claims are made, is in the Kzyl-Odar region of the Kazakh Republic across the Syr-Darya River. Said to be the largest hydroelectric project in Central Asia, the work will provide for extensive irrigation in one of Russia's biggest rice producing areas. The completion date is set for 1948.

Railway Electrification—Plans for restoration and development of Soviet railway transport envisages extensive use of electrification. It is claimed that the next five years will see the introduction of electric traction on more than 3000 miles of lines, both heavy traffic and suburban. Projects of first priority are in the Urals and Siberia where mountainous terrain and difficulties of winter operation of steam equipment make electrification particularly attractive. One of the railways due for electrification is the Moscow-Sverdlovsk line connecting the eastern and central districts of the country. Electrification is also contemplated on the more difficult sections of the railway connecting the ice free port of Murmansk on the Barents Sea with Leningrad.

Shoddy work caused building failure

BRAZIL—The stir caused by the collapse in February of a 10-story apartment building in Copacabana, Rio de Janeiro's fashionable seaside district, has died down now that details of the official investigations into the causes of the disaster are being suppressed by governmental authorities.

Police inquiries, carried out before the mayor of Rio City passes the matter to a special committee of three engineers, revealed that the building (8 of whose 19 apartments had already been sold) was practically finished and was to have been ready for habitation in two months.

Materials, inspection faulty

During the police investigations the following significant facts were revealed:—First examination of the site just over a year ago, showed the presence of water from an underground stream 5 meters below the surface; pumping out was done but no piles were driven; the man in charge of the reinforcing steel installation was discharged after 4-5 months of work because he called the firm's attention to defects in the steel; proper control over concrete mixing was not exercised, and for lack of sand a disproportionate quantity of stone dust was employed.

On the day that the building collapsed the head of the construction firm was shown a crack in a column on the second floor. Ordering a wooden beam to be fixed temporarily to support the joist on the column, he left the building to get material to fill in the crack, without however ordering the workmen out of the building; on returning he found the building reduced to a heap of rubble and 12 workmen dead.

An accident of this nature has naturally put constructors on their guard against employing inefficient methods or inferior material, but no great anxiety is felt regarding the possibility of collapse of other buildings. The Brazilian building trade is considered to be mainly in the hands of reputable construction firms. On paper the building code in Brazil is good, but in practice evasion is easy. Building plans must be approved by the local municipal authorities, but supervision of their execution is often inadequate and sometimes not carried out at all, although a municipal charge is levied for this purpose.

Loose financing

What Brazilian building business circles are somewhat anxious about is the present system of financing apartment building in Rio and Sao Paulo where a building boom has been in existence for several years. The covered area authorized for building in Sao Paulo city last

(*Continued on following page*)

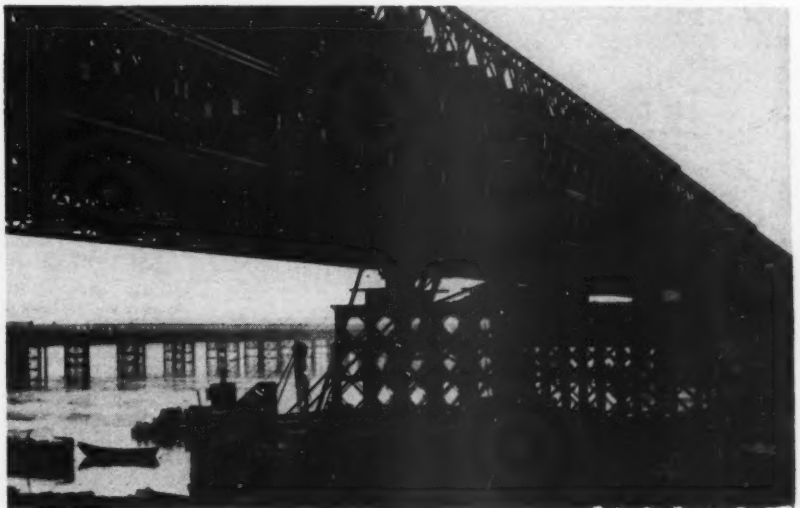


photo by British Combine

***Triple-Bailey Replaces Dutch Bridge**—After two months of strenuous work under adverse climatic conditions, British Army Engineers recently announced the opening of a new bridge over the Rhine at Arnheim, Holland. The span, a "750 ft., double-oblique, triple Bailey bridge," is said to be capable of carrying 40-ton loads. The two sets of triple-depth trusses, set side-by-side, provide for two-way vehicular traffic. Supported on concrete piers of the war-damaged span, the bridge joins undamaged sections with the river bank.*

year reached an all-time record of 2,350,000 sq. meters (55% increase on 1944), the capital city following close with 2,047,000 sq. meters (23% increase). Greatest activity (due to the housing shortage) was in the construction of apartments sold under a cooperative plan, prices of which would seem to be much higher than was warranted.

Larger apartments in fashionable Copacabana range from $15,000 to $30,000, and smaller ones from $8,000 to $12,000. The present system of financing, by inviting the public to purchase apartments before the work is started, establishes no control over the use of the funds and has led to abuse. Funds received for the purchase of apartments in a projected building are frequently diverted to enable another building to be finished, and certain promoters when hard-pressed for cash to finish a building often put off installing an object, such as sanitary fittings, without which official license for habitation is withheld. Practices of this kind are frequently excused on the grounds that the article in question is not obtainable for the moment because of short supply, strikes, etc.

Recent indications are that the building boom is slowing down, but it is believed that it will continue for so long as inflationary factors operate which cause investors to prefer putting their money in bricks and mortar to keeping it on deposit in a bank.

Comment by A. J. Boase

I am not greatly surprised to learn of the apartment house failure noted nor would I be surprised to hear of others. This failure is the result of dishonest political maneuvering which permit the use of inferior material and practices and the avoidance of any type of government supervision. These practices are all too noticeable in Brazil on speculative work.

In my article "Construction Practices," (ENR, Sept. 6, 1945) I made this comment: "I also saw some work which I regard as a perfect illustration of how not to do it. I shall long remember one job which I was asked to leave when the superinntendent learned I was a foreign engineer. The concrete was watery and segregated badly. The forms were poorly made. The reinforcing steel was so badly placed and anchored that it fairly bounced as the concrete fell from the buggy to the form."

It would be extremely unfortunate if, because of this failure, one were to jump to the conclusion that all work was shabbily done. There are engineers in South America, as elsewhere, who are much sought after by speculative builders because of their ability and political maneuvering rather than for their technical skill and keen desire to do a good job.

DEVELOPMENTS BEYOND U. S. BORDERS

Dam 700 ft. high planned for Swiss hydro project—Road tunnels converted to factories in Italy and France—Laboratory in Colombia

Perched high in the Alps and about 1,000 ft. directly above the famous St. Gothard railway tunnel, a gravity type dam nearly 700 ft. high from the reservoir bottom and 800 ft. from deepest foundation will be built by the Swiss firm, Societe des Force Montrices d'Urseren if plans developed by its engineers are carried out. Work has already started on other elements of the project.

Requiring 6,500,000 cu. yd. of concrete, the dam would be 1,800 ft. long at the crest and 580 ft. thick at the base, according to an article in *Le Genie Civil*, Feb. 1, 1946. It is planned to build it in three steps, first to 500 ft. above the reservoir bottom providing 520,000 ac.-ft. of storage, then to 585 ft. for 585,000 ac.-ft., and finally to 685 ft. for 780,000 ac.-ft. Eight years would be required to complete the first stage, including the necessary generating stations, and the cost would be about $175,000,000.

The dam, to be known as Schölleren Canyon Dam, would be located near the tourist town of Andermatt, not far from the north portal of the St. Gothard tunnel. It will store the waters of the Reuss River, and the project would, in addition, be supplied by conduits from other watersheds in the area where are located the headwaters of such great rivers as the Rhine, the Rhone and the Po.

Generating plants will be built downstream to utilize the 3,800 ft. of head, one of the penstocks being planned for a discharge of 4,250 cfs. In the first stage of development, four plants will be built to provide 1.8 billion kw. hr. per year. Final development envisages production of 3 billion kw. hr.

Research . . . . .

Colombia—The National University of Colombia, at Bogota, working with the Iowa Institute of Hydraulic Research of the University of Iowa, will soon begin construction of a hydraulics laboratory to cost in excess of $100,000 for buildings alone.

Work on design of the laboratory started in the fall of 1944, when Prof. L. E. Orduz of the Colombian school arrived in the United States to arrange for the design and equipment of the structure. His visit resulted in signing of a contract between the two schools for complete design and supervision of construction.

Preliminary sketches, prepared by Prof. Hunter Rouse, Iowa Institute director, called for a 3-story, reinforced concrete building about 50 by 100 ft. The basement contained reservoir and measuring basins, pumps and blowers and a small shop. The first floor, arranged for student instruction in fluid mechanics, provided for small air and water tunnels, a glass-walled flume, a small towing tank, a reversible-flow sand filter, a water-hammer unit and other units; while the other floors were to house hydraulic-model studies, offices, a lecture hall and a library or study hall.

After approval of the preliminary design, the staff of the Iowa Institute during the past winter prepared complete details and specifications for all experimental equipment.

Design of the laboratory structure is now under way at Bogota, and construction by Colombian contractors will proceed simultaneously with fabrication of equipment.

Tunnel factories . . . . .

Italy—Making use of every possible bit of cover for the great factories that were designed to supply their forces in a desperate last stand in Austria and Northern Italy, German engineers succeeded in concealing two entire aircraft engine factories in open-sided road tunnels originally built in 1931 to accommodate a highway running along the west shore of Lake Garda.

The "factories" comprise some 74 tunnels varying in length from 30 ft. to 400 yds., cut into the side of mountains along the lake shore for a 20-ft. roadway.

The tunnels were connected by a con-

cealed railway, and supplied by lake steamers, so that no evidence of the great activity was apparent. Half of the tunnels were completely stocked with machinery and were apparently operating at full blast when the German Army surrendered.

Power was supplied by a 6-mile-long overhead cable from a plant below Lake Ledro. Allied officials said that some 10,000 persons were employed at the factories. Huge stores of materials were found in chambers cut underneath the original roadways.

France—Somewhat similar to the recently-discovered tunnel-factories in Italy was the use to which German engineers put a partially-completed highway tunnel near Paris (see picture below).

Before the war, France had started work on some superhighway exits from Paris, and one of these leading west to Versailles—included a vehicular tunnel whose eastern portal was located just beyond the bridge across the Seine in the St. Cloud section of the city. The tunnel was completed, but the highway beyond the west portal had only been started when the war shut down the work.

Of roughly elliptical section, the tunnel is 56 ft. wide and has a 21 ft. clearance over the roadway—a truly large bore by any standard. It is 2,750 ft. long, lined with white tile, and brightly lighted. A made-to-order underground factory, the Germans pre-empted it for torpedo assembly operations. The torpedos were taken by barge down the Seine to LeHavre.

At the time of the liberation of Paris, the tunnel was lined full length along one side with racks containing hundreds of completed torpedoes.

Reconstruction . . . . .

China—The United States Export-Import Bank has announced approval of a loan of more than $33,000,000 to the Chinese government, for use in rehabilitating its railroads and power systems.

Of the total, $16,650,000 is to be used for purchase of railroad equipment—in the United States—including a large tonnage of rail and some 50,000 tons of bridge steel. The sum of $8,800,000 is earmarked for auxiliary steam power plants—ten units, each of 5,000 kw. capacity, being planned. The credits will be used only for partial restoration of damaged equipment, and not for new development. Of China's total of 9,000 miles of railroad trackage, some 2,000 mi. were totally destroyed, government sources said.

Holland—The Netherlands Commission for Rehabilitation and Reconstruction has announced a 10-year program for reconstruction of homes and commercial establishments that will call for the expenditure of more than $300,000,000. The program will include reconstruction of thousands of homes, repaving and rerouting of highways, repairs to railways, and construction of desperately-needed sewers and water systems.

Miscellany . . . . .

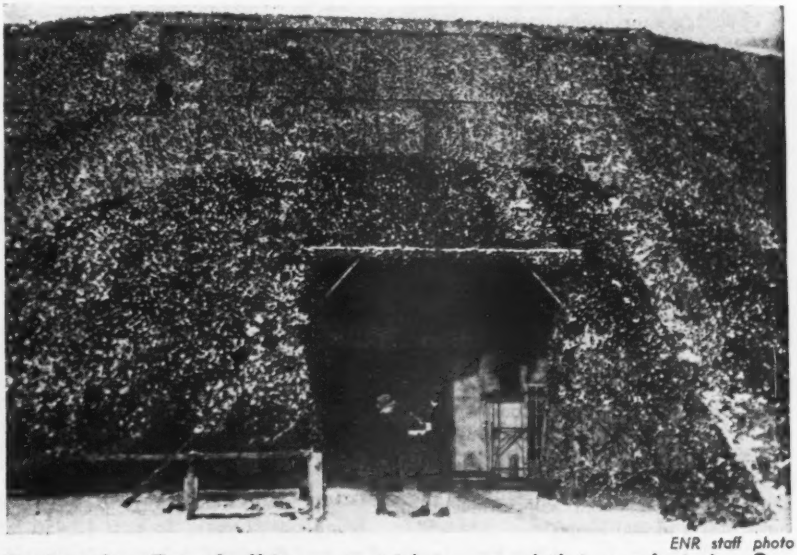
Brazil—The first all-welded gas holders built in South America were recently erected at Volta Redonda for the Brazilian National Steel Co., by Stacey Bros. Gas Construction Co., of Cincinnati, Ohio. The holders have a combined capacity of 6,000,000 cu.ft., and almost 2,700 tons of steel was used in their construction.

South Africa—The Union of South Africa is currently in the midst of what local authorities termed a widespread building boom, with trained engineering personnel and new equipment generally inadequate to meet demands. Last year, permits for $160,000,000 worth of new buildings were issued, with gold mining companies alone requesting $8,000,000 worth.

Eire—A 5-to-7-year program of railroad and motor-bus expansion, to cost several hundred million dollars, is already under way here, according to the Irish Railway System Commission. Railroad lines will be converted from single to double-track, a number of stations will be rebuilt, and warehouse facilities in Cork, Limerick and elsewhere will be expanded. A new concrete wharf is planned at Waterford, and a large central omnibus station is already under construction in Dublin.

Puerto Rico—The Puerto Rico Housing Authority will receive bids this week (April 22) for the construction of low-rent housing projects consisting of 948 units in the municipalities of Aguadilla, Guayama and Vieques. A recent act of the Insular Legislature authorized an appropriation of $2,20,000 to the housing authority to finance this work, as well as $1,000,000 to the San Juan Municipal Housing Authority.

Egypt—Specifications are now complete for the construction of a $35,000,000 hydro-electric station at Aswan Dam on the Nile River in Egypt, according to a report from the Egyptian Legation in Washington, D. C. Prospective bidders may inspect the plans at the Ministry of Public Works in Cairo, or at the office of the consulting engineers, Kennedy & Donkin, 12 Caxton Street, London. As yet a bid-opening date has not been determined. The station will have an installed total capacity of 280,000 kw., rather than 375,000 kw. as reported in *ENR* Mar. 28, vol. p. 456. Additional details on this project were given at that time.



ENR staff photo

***Factory in a Tunnel**—Using every trick to conceal their war factories, German engineers converted this unused highway tunnel outside of Paris, France, into a plant for production of torpedoes. On a planned major highway to Versailles—never completed because of the war—the tunnel is 2,750 ft. long, 56 ft. wide and has 21 ft. roadway clearance. Brightly-lighted, it was a made-to-order, bombproof and well concealed factory.*

Housing field developments reviewed

Housing continues to be the No. 1 domestic problem in the United States. The search for remedies for the nation-wide housing shortage and positive action to overcome it are engaging the attention of federal and state governments and bureaus, municipalities, organizations, builders, contractors, and individuals. Here are some of the recent developments:

In passing the Patman Housing Bill (HR 4761) the Senate approved an appropriation of $600,000,000 for subsidies to increase the output of critical and new-type building materials needed for housing construction. The House had knocked out the subsidy appropriation in its earlier action on the same bill (*ENR* Mar. 14, vol. p. 377)

Expansion of the priorities system for the building of veterans' housing to include some types of non-veterans' housing has been announced by the Civilian Production Administration and the National Housing Agency, in an amendment of CPA's Priorities Regulation 33. Builders of non-veteran housing under construction before the building control order of March 26 may now apply for priorities assistance to complete such houses and apartments.

Since the establishment of the veterans' home building priorities system, the Federal Housing Administration has approved applications involving 245,000 dwelling units. All of these new dwellings units are to be built for sale at $10,000 or less or for rent at $80 or less a month; with 55 percent of the total approvals being for units to sell below $6,500 or to rent at under $60 a month.

Having a bearing upon the possibility of obtaining more lumber for housing is the recent Senate approval of the outlay of $1,600,000 for harbor improvements at Crescent City, Calif., to provide access to 15 billion bd. ft. of lumber now far away from any railroad line. Housing Expediter Wilson W. Wyatt says that in the Crescent City area are 9 billion bd. ft. of redwood, about 2½ billion bd. ft. of Douglas fir, and more than 3 billion bd. ft. of mixed conifer timber.

At the same time, NHA announced that during January and February, lumber imports exceeded exports by almost 60 million bd. ft. During those two months, total lumber imports were more than 160 million bd. ft., while exports in the period were about 112 million bd. ft.

The Housing Authority of Griffin, Ga., has received approval on a $1,350,000 housing project, which will involve the construction of 300 homes.

Craftbilt Homes, Inc., of San Francisco, Calif., has bought about 300 acres of subdivision property at Sacramento for the immediate construction of 500 homes. The development, including streets and a water system, is expected to involve approximately $2,000,000. Priorities have been obtained already for 200 homes and actual construction has started.

Howard P. Vermilya, research director of the John B. Pierce Foundation, has been appointed to the staff of Wilson W. Wyatt, National Housing Expediter and Administrator of the National Housing Agency, as a consultant on technical problems. Clarence W. Farrier, former NHA technical director, is leaving government service to become assistant to the president of Gunnison Homes, Inc., New Albany, Ind., a subsidiary of the U. S. Steel Corp.

Veterans will have first chance at some 150 new houses, costing $2,500 to $3,000, to be constructed at Pendleton, Ore., by Collier & Harris, builders, who said the buildings would be 4-room frame residences on tracts of a half lot or slightly larger. OPA priority will be sought for the project, which already has started with ten homes under construction. Another addition planned there by the Harris firm would include 60 higher-cost homes.

In Canada, during 1945, there were created 46,960 dwelling units by new construction and conversion of existing buildings. New buildings totaled 41,032 or 87.4 percent; 31,700 of these were single dwelling units.

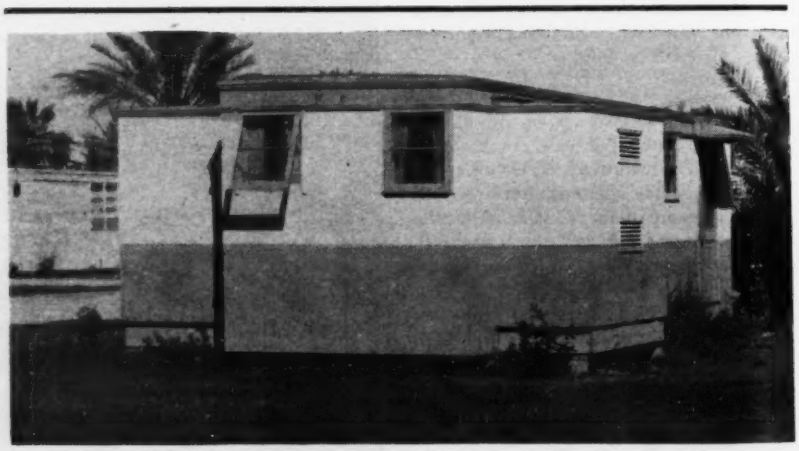
Building officials issue code on prefabrication

Publication of tentative basic building regulations covering prefabricated structures has been announced by the Building Officials Conference of America, Inc. in anticipation of a large increase in prefabricated housing.

The code is intended to serve as an authoritative guide to local building officials confronted with the problem of screening a wide range in type and quality of prefabricated houses. It will permit the use of all materials or methods of construction that meet minimum strength, durability and fire-resistive requirements. Provision is made for the testing and approval of new materials not specifically provided for.

A basic code, for country-wide use, of which the prefabrication part is the first section available, has been in preparation by the conference for almost two years. It will be a "performance" code as differentiated from the ordinary specification code. The prefabrication section is being published at this time to assist local building officials to cope with the emergency problems of the present housing situation. Quite probably, it will be revised before incorporation in the final national basic code.

The basic code committee is headed by Albert H. Baum, building commissioner of St. Louis, Mo., and its work is being co-ordinated by George E. Strehan, consulting engineer, 16 E. 43rd St., New York 17, N. Y. from whom further information may be obtained.



Mass-Produced House for $2,450 *—Mass production of 48,900 two-bedroom "Wingfoot Homes" to cost $2,450 f.o.b. factory is promised by the Goodyear Tire and Rubber Co.—provided needed materials and equipment are available. The buildings can be shipped as a "package" 26-ft. long by 8-ft. wide, with two wings (shown extended in above rear view) being telescoped for easy handling. Wings open up to a 15-ft. width. Sinks, showers, and stoves are built in and ready for connection. Flooring is plywood, exterior walls are Presdwood, and roof of plywood with asbestos cover.*

Civic responsibilities of engineers stressed at ASCE spring meeting

Representative Hinshaw cites small number of engineers in public service and urges society to foster participation in civic affairs

Engineers have no right to criticize lawyers or others for the way they conduct the affairs of the nation or of their own municipalities if they have had no part in efforts to improve government, Representative Carl Hinshaw—only civil engineer in Congress, told members of the American Society of Civil Engineers assembled in Philadelphia for the society's spring meeting, April 17-19.

"Stop sitting back and waiting to be consulted," he said, "take the initiative in seeking attainment of desirable objectives.

"To achieve his highest usefulness to our society, the engineer should himself achieve authority in the affairs of society," the Congressman continued. "The reason that the ordinary or garden variety of politician attains public office is because better-equipped men shirk their responsibilities as citizens."

More group action

In a somewhat similar vein, W. W. Horner, president of the ASCE, at the opening session of the meeting laid stress on the importance of taking the initiative in matters of national import. He cited as commendable examples the report on demilitarization of German industry prepared by the presidents of the five major engineering societies, and the similar report on Japanese industries being prepared by the Engineers' Joint Council.

Mr. Horner noted with some concern a trend toward nationalization of more and more engineering work through expansion of federal departments and bureaus engaged in engineering work. The great danger in this, he said, is the resulting regimentation and the apparent willingness of engineers down the line to let all policy decisions be made at the discretion of Washington officialdom.

Philadelphia's public works

Two speakers at the opening session pointed to Philadelphia's enviable position in the matter of planning and financing needed public works. They were Mayor Bernard Samuel and Edward Hopkinson, Jr., chairman of the City Planning Commission. Mayor Samuel said that the city has $106,000,000 *of its own money* that it is now in a position to spend, and expects to have $25,000,000 more made available in the near future through bond authorizations.

This is exclusive of money to be spent by the state on highway works in the city, and by the federal government on river works and hospitals.

The planning commission has before it $443,000,000 of work, of which $316,000,000 is on the program for the years 1946-51. Philadelphia operates on a six-year advance planning program, which is reviewed and extended annually.

Plans for highway research

Plans of the recently established Research Correlation Service of the Highway Research Board were summarized at the Highway Division meeting by Roy W. Crum, director of the Highway Research Board. It is proposed to coordinate the research work of the state highway departments, the Public Roads Administration and the Highway Research Board in order to get the most value from each project. There will be no attempt to regiment the research, Mr. Crum said.

Studies made by the firm of Modjeski and Masters for a high-level crossing of the Schuylkill River at Penrose Ave. in Philadelphia were described by Frank M. Masters to illustrate the type of problem faced in reconstructing a major highway into a large city.

The present movable bridge is a serious bottleneck, hence it is now proposed to carry the highway over the navigable channel with an underclearance of 135 ft. As approach grades are limited to 3 percent, this means a structure over 8,000 ft. long across soft bottom land.

Dual-dual highways

What he characterized as a dual-dual highway was described by Charles M. Noble, New Jersey's new highway engineer, in a paper telling of plans for meeting the growing congestion on existing routes approaching New York City from the south. Mr. Noble said that it is economically possible to construct only one more highway roughly parallel to U. S. Route 1 since that will exhaust areas free of heavy industry. Hence it is proposed to build two 2-lane highways complete with shoulders and median zones *in each direction* within a single right-of-way. The four outer lanes will be for local traffic and the four inner lanes for through traffic. The outer two lane highways will be built first.

Generally 8-lane construction is not favored by the state highway department, but it appears to be the only practical solution for this difficult problem.

Ice troubles at power plants

A wide variety of information gained in handling ice at power plants on the Susquehanna River was passed on to the Power Division by Paul E. Gisiger, structural engineer for the Pennsylvania

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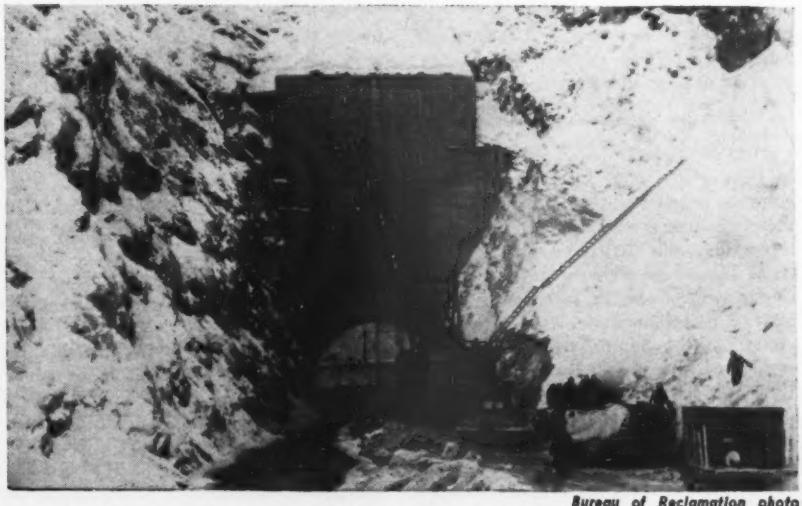


Bureau of Reclamation photo

***Divert Water for Anderson Ranch Dam**—Working in freezing weather, workmen have placed a wooden flap-gate in an old diversion tunnel to cut off the entire flow of the South Fork of the Boise River near Mountain Home, Idaho. Water is rising, and within a few weeks will pass through the inlet of permanent outlet works 120-ft. above the plug. In a race against spring flood-time, crews of Morrison-Shea-Twaits-Winston Co., contractors, are working to bring the great earth-fill dam to a height sufficient to impound 45,000 ac. ft. of water (ENR, Oct. 25, 1945, vol. p. 551). Dam will reach height of 456 ft.*

Water and Power Corp. and the Safe Harbor Water and Power Corp.

Static ice pressure on a dam, Mr. Gisiger said, need never be expected to exceed 10,000 lb. per lin. ft., despite much higher theoretical computations of the pressure, because of buckling of the ice sheet, crushing and plastic flow. Dynamic forces may be more serious than static forces, Mr. Gisiger said. Floating ice cakes and movements due to ice jams can do considerable damage, especially to crest gates.

If crest gates are to be kept in condition for quick operation, they must be reasonably free from ice. Such freedom can be obtained most successfully by producing an upward flow of air bubbles in front of the gate, which not only agitates the surface but also causes an upward flow of warmer water. Gate guides and seals are best kept free by heating. Electric devices are most satisfactory for this. Portable heaters are required for melting frozen spray or chains, and lifting beams.

Subdrainage of airfields

Two papers stemming from studies of drainage of base courses for airfields sponsored by the Boston district office of the U. S. Engineer Department were actively discussed at the meeting of the Soil Mechanics and Foundations Division. Arthur Casagrande, associate professor of civil engineering at the Harvard graduate school of engineering, reviewed the mathematical studies and William L. Shannon, of the district engineer's office, told of the model studies made in conjunction with the theoretical analysis. Prof. Casagrande said that it is impossible to solve this problem by a rigorous mathematical approach. Nevertheless, formulas can be developed to aid in the solution of some elements of the problem.

Stream pollution abatement

Most of the large public water supplies in Pennsylvania are taken from surface streams, hence reduction in pollution of those streams is of great importance to the state. This statement was made by H. E. Moses, chief engineer of the state's Department of Health, in outlining progress in pollution abatement at the first session of the Sanitary Division. (For details of the abatement program see *ENR* March 7, vol. p. 330.)

One of the major elements of this pollution-control work, removal of some 30,000,000 cu. yd. of culm and silt from the Schuylkill, was described in more detail by James H. Allen, chief engineer of Interstate Commission on the Delaware River Basin. Pennsylvania has appropriated $5,000,000 for this work in the part of the river above Norristown and the federal government has been asked to remove deposit from the lower river where it is navigable and where the government now spends $400,000 annually for dredging. This work will greatly reduce flood damage and will be of much benefit to waterplant operators.

Army sanitary work

A plea for maintenance of an adequate and independent Sanitary Corps in the Army during peace time was made at the second session of the Sanitary Division by W. A. Hardenbergh, editor of *Public Works*, until recently a colonel in the Sanitary Corps. Mr. Hardenbergh reviewed the sanitary work of the Army during World War II, pointing to some of the difficulties resulting from having sanitary engineering work subordinated to medical officers whose knowledge of sanitary developments is out of date.

Navigation and flood control

Plans for the control of floods in the Delaware River basin and for maintaining navigation on the lower reaches of the river were outlined at the Waterways Division meeting by C. F. Wicker and L. D. Shuman of the Philadelphia District, U. S. Engineer Department. Mr. Wicker said that attention at present is being centered on flood-control for the Lehigh River valley, which has suffered serious damage in the past, because studies conducted by the Army Engineers have indicated that there is no major flood problem which requires a comprehensive plan for the entire Delaware watershed to relieve conditions on the main stream.

Surveying instruments displayed

Surveying instruments developed or perfected during the war were on display at the Surveying Division meeting along with some captured instruments brought there by Lt. Col. W. S. Little of the Engineer Board at Ft. Belvoir in connection with a talk on Army survey equipment. American manufacturers, Colonel Little said, deserve a lot of credit for what they accomplished after they were cut off from British and Swiss sources of surveying equipment.

The advantages of having a system of plane coordinates available when projects such as highways are being studied were told to the surveying division by B. E. Beavin, of Baltimore.

Opportunities for veterans

Factors that are making it difficult for veterans to get jobs in the construction industry were reviewed by Day Okes of the Okes Construction Co., St. Paul, Minn., at the opening of the Construction Division meeting. In theory, Mr. Okes said, there should be many opportunities for veterans as apprentices in the building trades, but as the unions limit apprentices to a percent of the actively engaged journeymen, there will not be many such jobs until there are enough jobs for available journeymen, which is not the case today. Lack of materials and restrictions of various kinds are keeping construction from expanding fast enough to absorb many veterans.

How rapidly construction operations may be expected to expand was the subject of a talk by Donald D. King of King Advertising Services, former member of the editorial staffs of *Civil Engineering* and *Construction Methods*. Using statistics compiled by *Engineering News-Record*, Mr. King said that there was a 61 percent increase in construction in 1945 after V-J Day and that an increase of 50 percent over 1945 appears probable in 1946 despite the recent restrictions placed on new work other than housing.

Collective bargaining

Progress made by associations of professional engineering employees set up under ASCE auspices to aid engineers in need of separate representation in collective bargaining with employers was reported to the Board of Direction of the society at its spring meeting, held in advance of the general meeting. Most of these associations have been organized in the far West. In general, they have run into few difficulties. However, in the Los Angeles Gas Co. case the National Labor Relations Board declined to limit the "appropriate unit" for collective bargaining purposes to professional engineering employees as defined by the ASCE, indicating that the ASCE plan may have to be modified to include sub-professional men to be fully effective. Details of this case were given in the March issue of *Civil Engineering*.

Fall of a giant boulder damages power plant

A 5-ton boulder, loosened by heavy rains, recently broke two of four 4,350-ft. penstocks at the Southern California Edison Co.'s generating plant No. 1 at Big Creek, Calif.

A third penstock was also damaged at riveted joints by rocks carried in the resulting flood, while a fourth unit was left undamaged. The penstocks are 44 in. in dia. at the upper end, 24 in. at the powerhouse, and develop a 2,130-ft. head.

The three damaged penstocks furnish water to 18,000 kw. generator units, while the undamaged one supplies a 28,000-kw. unit.

Water from the break hit the powerhouse about 3 min. after the boulder struck, carrying muck and debris which crashed through the west powerhouse doors and prevented operators from shutting down one unit which ran under water for about an hour until the penstock had drained.

Engineer Board holds "open house" at Belvoir

Three-day exhibit at Fort Belvoir stimulates interest in peacetime application of war research and development work

An "open house" exhibit prepared by the Engineer Board at its Fort Belvoir, Va., headquarters last week gave observers an opportunity to see what went on behind closely guarded doors during the war. Many notables from the scientific and industrial world as well as military representatives attended the exhibit on April 16-18. Col. James C. Marshall, President of the Engineer Board, was host.

Featuring captured enemy equipment and the Engineer Corps counterpart, the exhibit revealed developments in the 14 research classifications with which the board is concerned. Among the thousands of items on display was a recent acquisition from Germany called a stereoplanigraph. Used for plotting sterescopic photography and for aero-triangulation from aerial strip photography, it was said to be most universal and elaborate photo-mapping instrument ever constructed.

Also displayed was a German stadia transit, which determines horizontal and vertical distances by the stadia method and thus avoids the difficult computations required in the use of similar American-made devices.

Jap compressor is unique

While most of the captured Japanese equipment was far inferior to either American or German counterparts, they did develop a free-piston, diesel-driven air compressor that was characterized as unique. Delivering 3,000 cu. ft. per minute at 300 psi., the compressor was comprised of a single combustion chamber located in the center of a cylindrical housing, and so arranged that two opposing pistons were driven outward simultaneously. When combustion occurs between the two pistons, the outward drive compresses the air in the cylinders. This machine minimized vibration to the point where it could be installed without a foundation.

Most of the American equipment shown has been described in this journal from time to time, notably in the issue of Feb. 7, 1945, vol. p. 199. Of new interest to construction engineers, however, was a track-laying tractor equipped with an auxiliary set of large rubber tires. Raised above the ground level when the machine was used as a tractor, these tires could be forced down to raise under the machine and thus prepare it for rapid towing to a new site.

It was announced that reports on captured equipment on exhibit at the Engineer Board, and on certain of the research, development and testing work of the board are being made available through the Department of Commerce. A bibliography of these reports, issued weekly on a subscription basis by the Department of Commerce, Office of the Publication Board, is published with the approval of the Director of the Budget. It is for sale (price not yet determined) by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Approve $228 million Army civil works

A compromise War Department Civil Functions Bill (H. R. 5400) appropriating $288,505,000 for the fiscal year 1947 for civil works construction and planning by the U. S. Army Engineers won approval by both houses of Congress April 19.

The House Feb. 7 authorized an expenditure of about $260,000,000 (*ENR* Feb. 14, vol. p. 249) and the Senate March 19 increased this to over $336,000,000 (*ENR* March 19, vol. p. 443). The compromise amount is $5,000,000 below the recommendations of the Bureau of the Budget.

As finally passed, the bill provides $132,391,000 for general flood control, $46,500,000 for flood control on the lower Mississippi and tributaries, $2,000,000 for similar work on the Sacramento River and $9,660,000 for preliminary studies and advanced planning for flood control. Major projects are shown in the table.

Money in the compromise measure for new rivers and harbors construction totals $42,253,750 and $40,175,500 for regular maintenance of rivers and harbors projects, which includes considerable construction. A sum of $3,000,000 is provided for examinations and surveys of this type of work, and $2,900,000 for alteration of bridges over navigable streams.

The bill also provides $8,000,000 for construction of dredges. A sum of $1,505,000 is also provided for the power plant at Ft. Peck.

The money provided in the Civil Functions Bill will supplement $125,000,000 supplied in the 1946 Deficiency Appropriation Act passed by Congress last December (*ENR* Dec. 27, 1945, vol. p. 849). Of this amount, $85,000,000 was for general flood control, and $15,000,000 for continuation of work on the lower Mississippi River. The remaining $25,000,000 is for navigation works.

GENERAL FLOOD CONTROL

Mansfield Hollow Reservoir, Conn.	$1,445,000
Union Village Reservoir, Vt.	1,309,000
Almond Reservoir, N. Y.	1,100,000
East Sidney Reservoir, N. Y.	1,200,000
Mt. Morris Reservoir, N. Y.	1,000,000
Williamsport, Pa.	1,300,000
Conemaugh Reservoir, Pa.	2,500,000
Buggs Island Reservoir, Va. and N. C.	3,000,000
Clark Hill Reservoir, Ga. and S. C.	4,500,000
Allatoona Reservoir, Ga.	4,500,000
Narrows Reservoir, Ark.	1,500,000
Blue Mountain Reservoir, Ark.	1,132,600
Norfork Reservoir, Ark.	1,000,000
Bayou Bodcau Reservoir, La.	1,300,000
Boeuf, Tenas River, and Bayou Macon, La.	1,000,000
Blakely Mountain Reservoir, Ark.	1,000,000
Memphis, Tenn.	1,000,000
Buffalo Bayou, Tex.	2,200,000
San Angelo Reservoir and Floodway, Tex.	2,040,000
Whitney Reservoir, Tex.	2,000,000
John Martin Reservoir, Colo.	1,122,400
Cherry Creek Reservoir, Colo.	2,968,500
Clearwater Reservoir, Mo.	2,000,000
Bull Shoals Reservoir, Ark.	5,000,000
Denison Reservoir, Tex.	3,000,000
Canton Reservoir, Okla.	2,500,000
Fort Gibson Reservoir, Okla.	3,500,000
Wister Reservoir, Okla.	1,750,000
Hulah Reservoir, Okla.	2,500,000
Tenkiller Ferry Reservoir, Okla.	1,000,000
Fall River Reservoir, Kans.	2,000,000
Wichita and Valley Center, Kans.	1,000,000
Kansas City, Mo. and Kans.	2,500,000
Kanopolis Reservoir, Kans.	1,972,000
Harlan County Reservoir, Nebr.	1,750,000
Garrison Reservoir, N. Dak.	4,000,000
Wolf Creek Reservoir, Ky.	4,300,000
Dale Hollow Reservoir, Tenn.	1,455,000
Center Hill Reservoir, Tenn.	4,150,000
Delaware Reservoir, Ohio	1,500,000
Muskingum River Reservoirs, Ohio	1,548,000
Portsmouth-New Boston, Ohio	1,000,000
Bluestone Reservoir, W. Va.	4,000,000
Massillon, Ohio	1,001,000
Dillon Reservoir, Ohio	2,000,000
Los Angeles River, Calif.	3,000,000
Detroit Reservoir, Ore.	1,700,000
Dorena Reservoir, Oreg.	2,018,200
Lookout Point Reservoir, Ore.	1,000,000
Fort Randall Reservoir, S. Dak.	2,500,000
Kings River and Tulare Lake, Calif.	1,000,000

NEW RIVERS AND HARBORS WORK

New York, N. Y.	$1,510,000
New York and New Jersey Channels	3,634,000
Cape Fear River, N. C. at Wilmington	1,000,000
Savannah, Ga.	1,000,000
St. Johns River, Fla., Jacksonville to Ocean	1,772,000
Apalachicola, Chattachoochee, and Flint Rivers, Ga. and Ala.	1,010,000
Pearl River, Miss. and La.	1,010,500
Gulf Intracoastal Waterway, New Orleans, La.	1,800,000
Gulf Intracoastal Waterway between Apalachee Bay, Fla., and the Mexican Border (Galveston District)	2,030,000
Trinity River, Tex. ($1,040,000 for advance planning and $450,000 for construction)	1,490,000
Neches and Angelina Rivers, Tex.	1,500,000
Crescent City Harbor, Calif.	1,000,000
Columbia River, Umatilla Dam, Ore. and Washington	2,600,000
Mississippi River between Ohio and Missouri Rivers	3,500,000
Missouri River, mouth to Kansas City	1,500,000
Missouri River, Kansas City to Sioux City	2,500,000
St. Mary's River, Mich.	4,611,250

Men and Jobs

Magdeline Fantone, assistant chemist at the Gary, Ind., sewage disposal plant, conducts chemical test under the eye of G. F. Johnson, assistant superintendent.

J. E. Motherall, city engineer for Austin, Tex., faces camera at the site of a new bath house under construction at the city's Barton Springs swimming pool.

Charles J. Stevens, senior architectural engineer, ordnance division, Bureau of Yards and Docks, tries out machines on a visit to Timber Engineering laboratory at Washington, D. C.

J. L. Jackson is in charge of the construction of a municipal waterworks dam at Sanford, N. C., being built to replace one which was washed out during a flood last September.

Cecil Harrison, of Clinton, Ill., has been appointed county surveyor of Vermilion County to serve until his successor is elected and qualified.

Col. Rufus W. Putnam, wartime engineer of the Army's Los Angeles district, became head of the Los Angeles office of Kaiser Engineers, Inc. on March 15.

J. Walter Lahey of Timmins, Ont., has been named town engineer of Dartmouth, N. S.

The Stanley Engineering Co. of Muscatine, Iowa, has announced that **Marvin O. Kruse** and **H. Sidwell Smith** have become partners in the firm.

R. Charles Adams, has been named superintendent of public works and assistant city engineer of Cornwall, Ont.

W. J. Overman is resident engineer for the North Carolina Highway Department on the construction of the Camden causeway near Elizabeth City, N. C.

W. W. Gwathmey, Jr. has been promoted to engineer of construction of the Baltimore and Ohio Railroad, with headquarters in Baltimore, Md., succeeding **Richard Mather,** retiring after 34 years' service. **J. W. Jones,** senior assistant engineer, succeeds Mr. Gwathmey as eastern regional engineer at Baltimore.

The Federal Works Agency field office at Wilmington, N. C., which is headed by **Colon F. Churchill,** supervising engineer, has been transferred to Concord.

Stephen E. Butzko, Fairfield, Conn., superintendent of the town highway department, has been appointed Connecticut chairman of the American Public Works Association.

Ben J. Hunter is now Jefferson County superintendent of highways, Mt. Vernon, Ill.

Fred W. Fisch of Schenectady, N. Y., and **Edgar B. Shrope** of Elsmere have been appointed principal planning engineers for the recently formed city arterial route planning bureau of the N. Y. State Department of Public Works.

J. W. Hanna, L. S. Hanna, Ray Bolch and **W. E. Bolch,** all of Hickory, N. C., have formed the Bohan Engineering Co. to specialize in surveys of urban areas.

Luther E. Pendergrass of Durham, N. C., has been promoted to first lieutenant with the Engineers Section of Sixth Army Headquarters at Kyoto, Japan.

Frederick J. Mayo, Albert P. Durso, Murray E. Johnson and **Donald W. Neville** have been elected vice-presidents of F. H. McGraw & Co., engineers and constructors, Hartford, Conn.

Paul L. Thomas, a civil engineering graduate of the University of Minnesota, has been appointed to head a new division of Northwest Airlines to direct the company's multi-million construction program.

John McCormack of Phoenix, Ariz., has gone to Guayaquil, Ecuador, to be engineer on location and construction for a highway project in the jungle interior.

H. E. Ramsey, civil engineering graduate of the University of Michigan, has been made manager of the new Akron-Canton, Ohio, airport.

J. Gordon Craig of Richmond, Va., is engineer in charge of the development of the special TVA demonstration project in the 10,000-acre watershed area of Thompson Creek, Russell County, Va.

Albert Molenaar has been appointed extension engineer in irrigation at Washington State College at Pullman, Wash. He has been project engineer for the U. S. Department of Agriculture on the Post Falls irrigation project at Coeur d'Alene, Ida.

Frank J. Kish, with Chas. T. Main Co., Augusta, Ga., is structural designer on the preparation of plans for Clark Hill Dam.

Allan W. Shattuck, has joined the department of public works, Regina, Sask.

Donald W. Gilfillan, U. S. Army Engineer, formerly at the Sacramento, Calif., office, has been appointed a member of the United Nations Relief and Rehabilitation Administration engineering staff in the Orient. He will assist other American engineers of UNRRA, including **O. J. Todd,** also one-

time Sacramento Army Engineer, now Yellow River Conservancy Advisor.

Brig. Gen. Raymond F. Fowler, who retired as the Army's South Atlantic Division engineer last year, has been named executive director of the Georgia State Ports Authority.

J. A. Rogers, has been appointed general manager and chief engineer of the Central Vermont Railway to succeed the late Roy D. Garner.

Harold W. Carss of Regina, Sask., has been appointed city engineer of Swift Current, succeeding **Vern Thierman,** retired.

John D. Fuller, Knoxville, Tenn., city plans engineer since Sept. 1944, has resigned to become city engineer at Tampa, Fla.

L. J. Clouser, principal sanitary engineer with the Tennessee Valley Authority for the last 11 years, has resigned to enter private engineering in Knoxville, Tenn.

Homer M. Hadley, for many years regional structural engineer for the Portland Cement Association on the Pacific Coast and latterly in the Pacific Northwest, has resigned to engage as a consulting structural engineer.

Edward Lincoln Story, Massena, N. Y., chief of the Contract Termination Branch, and chief of Readjustment Division, North Atlantic Division, Corps of Engineers, New York City, has been promoted to full colonel.

The Pennsylvania Department of Highways has announced the appointment of **Harold R. Zahnizer,** Brentwood, Pa., as Pittsburgh district office engineer.

James Q. Dolan, Pawtucket, R. I., has been appointed district construction manager, Civilian Production Agency, for the Rhode Island district.

A. C. Fulmor, who recently resigned as Riverside County, Calif., surveyor, after more than 30 years of service, has been appointed chairman of that county's planning commission, succeeding **Culver Nichols,** of Palm Springs, who resigned.

Edgar H. Potvin, of the Federal Public Housing Authority, has been named project engineer for the construction of emergency housing units being erected at Wilson, N. C.

Back to Civilian Activity

Charles N. Lane, of the Seabees, is resuming as assistant Vermilion County, Ill., superintendent of highways.

E. A. Beck, a graduate of Virginia Polytechnic Institute and a war veteran, has become town manager of South Boston, Va.

Addison H. Douglass, colonel, who commanded the 398th Engineering General Service Regiment, which rebuilt Cherbourg harbor, has joined Northwest Airlines as chief plant engineer.

Paul P. Wiant, ex Marine, is now architect and engineer for the Methodist Church in China at Shanghai, and is also in general civil engineering there.

J. T. Hendrick, major, Corps of Engineers is now associated with the water department in the design division, Ft. Worth, Tex.

Ernest A. Davidson, captain, Corps of Engineers, has joined the design division of the Highway Department of Delaware.

Carl D. Matthias, captain, C. E., U. S. Army, has returned to the flood control branch of the U. S. Engineers Office at Norfolk, Va.

Harry E. Curtis, lieutenant colonel, C. E., chief of supply section on the staff of the advance section, Ledo, Assam, is now connected with the Collins Construction Co., Kansas City, Mo.

The following have returned from the armed services and rejoined the staff of Fay, Spofford & Thorndike, Boston, Mass.: **Col. E. B. Myott, Lt. Col. Leon B. Turner, Capt. Mathaniel N. Wentworth, Jr., 1st. Lieut. Elmer G. Dana, Technical Sergeant J. Donald MacLean, Petty Officer, 3rd Class, Frederick J. Driscoll, Jr.** Other discharged servicemen who have recently joined the staff are: **1st. Lieut. Arthur J. Varley, Staff Sergeant Clifton J. Stewart, and Chief Petty Officer Joseph P. Wallis.**

Capt. Jack D. Kemp, formerly with the North Carolina State Highway Commission at Raleigh, N. C., has been released from the Army and has resumed his duties with the U. S. Engineers, assigned to the Savannah, Ga., district office.

Richard A. Haber, captain, Corps of Engineers, is again in the designing division of the Highway Department of Delaware.

James E. Kellogg, lieutenant, Corps of Engineers, has returned to the Illinois Division of Highways as engineering aid, 2, in the office of grade separations.

About District Engineers

Appointment of **Col. Leonard B. Gallagher** as United States district engineer at New Orleans, La., has been announced by Maj. Gen. Robert W. Crawford, president of the Mississippi River Commission. Colonel Gallagher, who formerly was division engineer in New England and district engineer at Boston, Mass., succeeds **Col. Fisher S. Blinn.**

Col. McDonald D. Weinert, who has been district engineer in Milwaukee, Wis., since 1943, will leave for a Pacific assignment and will be succeeded by **Col. Fisher S. Blinn,** formerly district engineer of the New Orleans office.

Col. Claude H. Chorpening has been appointed district engineer of the St. Paul, Minn., district. Colonel Chorpening has been executive officer to the director of military construction in the Office of the Chief of Engineers since January of this year. Before that he served as district engineer of the Honolulu Engineer District and also had been assigned to duty in the Middle Pacific. **Maj. Henry J. Manger** will be released from duty as district engineer of the St. Paul district upon the arrival of Colonel Chorpening. Major Manger remains assigned to the St. Paul Engineer district.

Col. Benjamin B. Talley has been assigned as district engineer of the Louisville, Ky., district. Colonel Talley has been district engineer of the Huntington, W. Va., Engineer district. **Lieut. Colonel John R. Sharp** was assigned duty as acting district engineer, Huntington district, upon the departure of Colonel Talley.

Col. Henry Hutchins, Jr., has been appointed division engineer, at Dallas, Tex., replacing **Col. E. H. Marks,** who is being transferred to San Francisco. Colonel Hutchins will be in charge of flood control, river and harbor, military and new Veterans' Administration construction projects in Oklahoma and the southwestern part of the United States.

A survey of the current conditions in the engineering schools

(Fourth of a series of reports from leading technical institutions)

Rensselaer Polytechnic Institute, Troy, N. Y.—"The trustees and faculty are planning to increase the normal peacetime enrollment of about 1450 by more than 100 per cent, or to about 3,000, provided sufficient housing accommodations can be obtained. Present plans are to admit about 200 students in July and about 500 in September. On that basis, our enrollment in September will be between 2300 and 2400.

"R.P.I. has established a policy of reserving for veterans from 75 to 80 percent of the enrollment in each new class, and from 20 to 25 percent for new graduates of preparatory and high schools who are not veterans.

"Progress is being made in the housing problem. The institute has purchased at a cost of $85,000 a nearby institutional property. After extensive alterations, this will house at least 150 students. We have been allotted 150 housing units by the Federal Public Housing Administration. Some aid is anticipated from the state of New York.

"Several thousand applications for admission are already on hand, and are being received now at the rate of about 450 a week. Of late there has been a considerable increase in the number of young non-veteran applicants.

"Refresher or pre-engineering courses established last September will be continued. Enrollment in these courses has been from 150 to 300."—Dr. Ray Palmer Baker, Dean of Students.

University of South Carolina, School of Engineering, Columbia.—"We can take more students in all classes. The next term will start about June 20. Temporary housing for 120 married veterans is being constructed and all the accommodations have been spoken for already. We have made no important changes in our courses."—Robert L. Sumwalt, Dean.

University of Arizona, Tucson—"Our total enrollment for the second semester is approximately 3100, which is nearly 900 over the registration for the first semester. Most of this increase is occasioned by the enrollment of veterans.

At present we are making a survey of our facilities to determine the total number of students who can be registered in September. It appears unlikely, in view of present facilities, that we will be able to accommodate any additional out-of-state students. We are planning to make some adjustments in our schedule of classes to the end that the present total can be increased, but it will doubtless be covered by returning veterans and others who are residents of this state.

Under the present circumstances, we are not accepting out-of-state applications but are advising all prospective applicants to make inquiry to this office about May 1. At that time we hope to know definitely whether or not additional out-of-state students can be accommodated in September.

The housing situation here at Arizona this year, as elsewhere, has presented quite a problem. At the present time the University of Arizona has no accommodations for married veterans, and this group is numbering about one-third of the total of some 1253 veterans left to find accommodations in the city. Some help has been provided through the Housing Bureau of the Tucson Chamber of Commerce, which has established a limited number of trailers at Consolidated Dwellings, a wartime facility. The government has indicated that it will allocate to the university sufficient housing units to accommodate 124 veterans on university property next fall. An effort is also being made to obtain additional accommodations of a temporary nature to be used as dormitories for men students on campus. Whether or not these will be provided is problematical at this time.

At the request of the deans of the College of Engineering and Mines, the university has instituted several refresher courses in mathematics. Veterans who have been guided into these courses find them helpful in reestablishing their foundation in mathematics."—C. Zaner Lesher, Registrar.

The University of Texas, College of Engineering, Austin, Tex.—"The College of Engineering, including the Department of Architecture, probably can accommodate 500 additional students; 200 more in the lower classes and 300 in the upper classes. Our present enrollment is between 1500 and 1600.

"Although we have provided several hundred hutments for married men, the housing situation remains acute. No matter how many rooms and apartments we announce they are immediately filled to overflowing.

"While we still maintain a number of refresher courses, for the most part the men prefer supplementary laboratory aid courses and visitors' cards to existing courses."—W. R. Woolrich, Dean of Engineering.

University of New Hampshire, Durham, N. H.—"The registrar's office will be unable to consider any out-of-the-state applicants for some time to come unless they have already made application for admission. We feel committed to accept applicants from New Hampshire."—Prof. E. W. Bowles.

Worcester Polytechnic Institute, Worcester, Mass.—"In order to save places for former students, we have had to refuse admission to applicants with advanced standing unless they can qualify for work in the two upper classes only.

"We expect to admit 180 freshmen Oct. 28, half of them veterans. Probably we shall not be able to accommodate more than half of those who apply and are qualified. We will have accommodations for married students in the dormitory of a neighboring institution.

"Changes in our curricula will include a strengthening of humanistic branches, new courses in electronics, chemical engineering, photogrammetry, etc. No refresher courses, but, in proper cases, veterans may repeat current courses."—Jerome W. Howe, Dean.

Thayer School of Engineering, Dartmouth College, Hanover, N. H.—"We are unable to accept for admission any students not previously enrolled in Dartmouth or in our Navy College Training program during the war. It is expected that our enrollment from these two groups will exceed substantially our previous capacity, and will be all we can handle adequately.

"Even within these, the housing situation for married students will be very critical.

"Our engineering program has been broadened by the addition of curricula in electrical and mechanical engineering. Our pre-war offering included only civil engineering and a combination curriculum in engineering and business administration."—William P. Kimball, Dean.

Stevens Institute of Technology, Hoboken, N. J.—"We could take more students in the upper classes. For the freshman class about to be admitted we already have twice as many applicants as we can possibly handle, and our sophomore class is already over-full.

"In the upper classes we can admit additional men to Terms IV., V., and VI., on May 27, and we shall have room for additional students in Terms IV., V., VI.,

VII., and VIII., on Sept. 23 next.

"Our housing situation, while tight, seems to be well in hand, or it will be by fall. Full housekeeping apartments for married men are very scarce, but in September we hope to be able to offer rooms or small suites for a reasonable number of married couples who are willing to take one or two meals a day in the college mess hall or elsewhere.

"We are not a civil engineering institution. Our only undergraduate curriculum is accredited as a course in general or basic engineering without designation of field. We have offered a series of very useful refresher courses for returning veterans proposing to enter Term I. just before each of the three dates per year on which such veterans have been admitted. Lasting three weeks, these courses have reviewed mathematics, physics, chemistry and English on the high school senior level, with a good deal of supervised computation. They have got veterans over the transition period effectively, and back into the habit of studying. In general, the records made by returned veterans have been very satisfactory."—Harvey N. Davis, President.

University of Illinois, College of Engineering, Urbana, Ill.—"The housing facilities determine the number of students which can be accommodated—the registration in the upper classes as well as in the lower. Many students were denied admission in the current semester. The issuing of permits for students to enter as freshmen engineers was stopped two weeks before the last registration.

"The undergraduate registration in civil engineering for the second semester of this year is nearly twice that for the first semester, and slightly exceeds the maximum prewar registration. There has been a marked increase in the graduate registration. Academic space and equipment are available for about 100 more men in the upper classes, but the staff for these men is not available, and the lack of housing is restricting the appointment of new staff members.

"When the present seniors are graduated, their housing space will be available for new students, but this will be far below the demand.

"The summer semester opens June 24, and the fall semester Sept. 23. The next summer semester will be only 12 weeks long in order to permit the return to the normal peacetime calendar. Hundreds of students were not permitted to register for the current semester, and it is expected that the situation will be far worse in September.

"In the past the university has provided no housing for married students, but about 400 prefabricated houses have been moved to the campus and made available to this group. Other married students are housed in private apartments and residences, but the total supply is far below the demand.

"There have been no important changes in courses to meet any special requirements of veterans. The demand for refresher courses has been small. The regular courses have taken care of this need.

"About $14,000,000 has been appropriated for increasing the academic and housing facilities on the Urbana campus. Working plans for several buildings, including residence halls, are now being prepared, but none of this space will be available until after September, 1947.—W. C. Huntington, Head of Department of Civil Engineering.

California Institute of Technology, Pasadena—"We are planning our program for returning veterans on a basis of assisting them to complete full regular curricula with a minimum of misplaced time and effort. No special training programs are being provided, but refresher classes in basic subjects are being scheduled to meet the convenience of veterans before they undertake the study of subjects in advance of the academic levels previously attained by them.

"As a means of meeting, to some extent, the wishes of a large number of veterans for college training, there is an enrollment in the lower years larger than has been accepted formerly.

"The housing situation for married students is very difficult. We are not in a position to provide special facilities."—Franklin Thomas, Dean of Students.

Engineering skyscraper

Above is a copy of an architect's drawing of the proposed 20-story skyscraper to be part of the $2,700,000 building program recently announced by Dr. Allan R. Gullimore, president of the Newark College of Engineering, Newark, N. J.

Polytechnic Institute of Brooklyn, Brooklyn, N.Y.C.—"A moderate number of new students can be taken in our upper classes. No vacancies at present in the lower classes. The next entering class will be in September but no consideration of applicants will be given until April.

"The housing situation here is very serious, especially for married students.

"Our curriculum has been revised. Practically all subjects are available as refresher courses. Many veterans are attending our evening classes."—Ernest J. Streubel, Dean of Students.

Case School of Applied Science, Cleveland, Ohio.—"We can take more students in the upper classes for the term beginning Sept. 19 next. We are admitting 250 freshmen twice a year, but are having several times as many applicants as we can handle.

"We have no dormitories and housing accommodations are very critical.

"We have a few new courses. Veterans may enter any time in a term any course for which they already have credit. They receive no new grade, the work being considered as refresher."—W. E. Vudd, Registrar.

Illinois Institute of Technology, Chicago—"In March we were able to accept quite a few additional students in the senior and junior classes, but are completely filled in the freshman and sophomore classes. The situation probably will be much the same when the fall term opens Sept. 17.

"The situation with respect to housing, especially for married students is extremely acute and we cannot see any immediate prospect of relief. We own a few houses in the neighborhood which we expect to operate as dormitories. Some of them should be available for the September term for single men only.

"We have added refresher courses in mathematics and physics. We are also planning many curricula changes, particularly elective choices, to make our courses more flexible and better adapted to individual needs.

"We have an extensive building program under way, with the first building nearing completion. This will increase our capacity, but still will not make it possible for us to accept all qualified applicants. We are doing our best and will maintain our institution at capacity enrollment."—J. C. Peebles, Dean of Engineering.

(To be continued)

OBITUARY

Harry Remington Bouton, 66, department engineer of the Board of Water Supply of New York City, died April 14 at White Plains, N. Y. For 37 of the 39 years since he left Rensselaer Polytechnic Institute in 1907 he had been with the Board of Water Supply. His work has included construction of City Tunnel No. 1, the 18-mile delivery tunnel of the Catskill system, and 15 miles of large conduits for the distribution of water from that tunnel. He was next engaged as senior section engineer on construction of 16 miles of 72-in. conduit in Brooklyn and Queens and later on five miles of the 17-ft. dia., City Tunnel No. 2. In 1936 Mr. Bouton became department engineer to supervise work on the southern half of the 85-mile Delaware aqueduct, a 13½ to 19½-ft. diameter deep pressure tunnel. In 1940 he was transferred to Headquarters Department in New York City in charge of design of structures and preparation of contracts for the entire Delaware water supply project.

Neil Stanley Buckbee, 62, chief engineer with Gannett, Fleming, Corddry and Carpenter, Inc., Harrisburg, Pa., died at New Cumberland, Pa., April 10. A graduate of Dartmouth College, Mr. Buckbee was first employed by the Corrugated Bar Co., Buffalo, N. Y., in 1909 as an engineer specializing in reinforced concrete structures. In 1929, he joined the Harrisburg firm and assisted in the development of that city's mountain water system and also in the preliminary plans for Harrisburg's proposed sewage treatment plant.

Gustav Anton Haggander, 61, assistant chief engineer of the Chicago, Burlington and Quincy Railroad until he retired April 1, died April 14 in Chicago. After graduation in civil engineering from the Armour Institute of Technology, in 1907, Mr. Haggander joined the Burlington as a draftsman, advancing to bridge engineer in 1916, to assistant chief engineer, Eastern Lines, in 1939, and to assistant chief engineer of the Burlington System in 1943.

Vernon P. Ligon, 56, who was an engineer in the Kentucky highway department from 1915 to 1934 and from 1940 to 1946, died in Frankfort, April 15. At the time of his death he was engineer in the design division.

W. M. Hartman, 67, on the staff of the city engineer's office at Harrisburg, Pa., died April 16.

Clifford A. Ellis, 67, inventor and former chief engineer of Socony Vacuum Oil Co., died April 20 at Palisades Park, N. J. He was graduated from Stevens Institute of Technology and in 1900 began his career with the original Standard Oil Co. of Bayonne, N. J. He was in charge of Socony Vacuum's expansion program in building bulk plants and pipe lines throughout the United States and Canada.

Few states have separate housing contract laws

With reference to the new law in New York state requiring split awards on public housing contracts as mentioned and editorially opposed in last week's issue of the *Engineering News-Record* (vol. pp. 534 & 537) it is of interest that only four other states have such laws. They are New Jersey, Ohio, Pennsylvania and North Carolina.

These state laws differ appreciably. There are different limits as to cost, the laws in each case not being effective for work costing below certain minimums. The New Jersey law applies to construction by counties and municipalities, as well as by the state.

Engineers approve water projects for Arizona

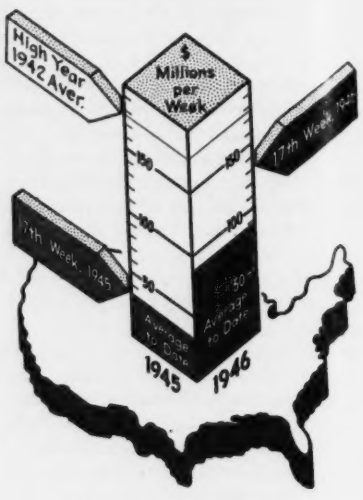
Water storage and irrigation projects that would cost $26,341,000 on a prewar cost basis have been approved for Arizona by the U. S. Army Engineers office, Col. George Mayo, Los Angeles, acting division engineer, announced recently. These are necessary in view of the water shortage in that area (*ENR*, April 18, vol. p. 529).

The projects recommended for adoption as desirable for flood control, water conservation, power development and other purposes include construction of the Buttes reservoir on the Gila river above Florence; the Charleston reservoir on the San Pedro river near Tombstone; construction of an aqueduct from the Charleston reservoir to Tucson, and alterations to the irrigation system in the Safford area.

The Buttes reservoir would store 400,000 acre-ft. of water and would cost an estimated $15,840,000. Its location would be approximately 30 miles below the San Carlos reservoir on the Gila river.

Costing an estimated $4,980,000 the Charleston reservoir would hold 238,000 acre-ft. of water. The aqueduct to Tucson, covering a distance of approximately 60 miles, is estimated at $3,556,000.

CONSTRUCTION ACTIVITY



As Reported this week to ... *Engineering News-Record*

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of April 25 1946	Cumulative 1946 (17 wks.)	Cumulative 1945 (17 wks.)
Federal	$20,775	$173,280	$301,931
State & Mun.	26,882	341,243	61,012
Total Public	$47,657	$514,523	$362,943
Total Private	83,937	1,001,950	157,643
U. S. Total	$131,594	$1,516,473	$520,586

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1946 (17 wks.)	Cumulative 1945 (17 wks.)
Waterworks	$905	$33,366	$11,730
Sewerage	1,335	19,263	10,116
Bridges	3,393	35,460	7,938
Highways	17,039	183,538	40,656
Earthwork, Waterways	11,844	97,528	11,642
Buildings, Public	3,670	98,588	213,686
Industrial	20,007	336,777	112,843
Commercial	57,888	595,440	26,355
Unclassified	15,513	116,513	85,620

NOTE: Minimum size projects included are: Waterworks and waterway projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1946 (17 wks.)	Cumulative 1945 (17 wks.)
NON-FEDERAL	$281,639	$201,556
Corporate Securities	108,000	48,024
State and Municipal	173,639	132,632
RFC Loans		20,900
FEDERAL	158,320	77,137
Total Capital	$439,959	$278,693

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Apr. '46	324.59	160.83
Building Cost	Apr. '46	254.37	137.50
Volume	Mar. '46	256	112